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AUTHOR Rickman, David L.
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ABSTRACT

According to A. R. Luria (1973) the cerebral organization of mental activity can be understood through analyzing how mental activity is altered in different local brain lesions. Recent brain function research has used this approach in locating areas of the brain involved in specific processes. This study recognized the importance of this method for locating specific cognitive processes within the brain, while stressing the need for more normative studies that answer the "how" and "what," not just the "where" and "when," of normal frontal lobe function. The study involved administering verbal and nonverbal fluency tests to 67 non-patients, investigating the effects of individual differences. The hypotheses of this study were that: (1) design fluency measures would correlate with word fluency measures; and (2) gender, education, handedness, eyedness, and other functions would not be associated with the verbal and non-fluency measures. Results suggested that no significant gender effects exist across all fluency and handedness measures. Eyedness was found to significantly affect measures of nonverbal fluency. Design fluency was revealed as the possible nonverbal analogue to word fluency. The hypothesis that education is not associated with fluency measures was rejected. (BGC)

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Running Head: DIFFERENCES IN FLUENCY MEASURES

Individual Differences in Verbal and Nonverbal Fluency Measures

David L. Rickman

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Individual Differences in Verbal and Nonverbal Fluency Measures

Luria (1973) asserts that the cerebral organization of mental activity can be better understood through analysis of how mental activity is altered in different local brain lesions. Most research in brain function over the past few decades has utilized this approach in locating areas of the brain involved in specific processes. The basic tenet of this approach is that if cognitive deficits exist in a lesioned individual, location of those specific processes/abilities can thus be indicated through comparisons with nonlesioned or control subjects. Subjects are usually, but not always, matched for age, gender, handedness, eyedness, and education in order to control the impact of these variables on between-group comparisons. The present study realizes the importance of this method in locating specific cognitive processes within the brain, however, the need for more normative studies is emphasized. The effort to establish the effects, if any, of individual differences is not strongly represented in the literature, indeed, the "how" and "what" - in addition to the "where" and "when" - of normal frontal lobe function must be explored. This is the perspective taken in the present study, in which nonpatient individuals were tested in an effort to investigate the effects of individual differences on verbal and nonverbal fluency.

Verbal fluency is believed to be dependent upon processes of

the left hemisphere of the brain (Milner 1964). Verbal fluency tests usually require the subject to produce as many words beginning with a specified letter within a certain period of time. This study utilized a word fluency test which consisted of two conditions - in the "free" condition, the subjects were given five minutes to produce as many words as possible beginning with the letter "s", and in the "fixed" condition, he or she was instructed to produce words beginning with the letter "p", except each word could only consist of four letters.

Jones-Gotman and Milner (1977) developed a nonverbal fluency task they considered to be analogous to word fluency tests. Subjects are requested to produce as many "nonsense" drawings as possible within a time-constraint. This test is comprised of two conditions - in the "free" condition, the subject is required to invent drawings representing neither actual objects nor anything derived from such objects, and in the "fixed" condition he or she is also instructed to produce nonsense drawings, except they must consist of exactly four lines. In the free condition, the subject is allowed five minutes to complete the drawings, and in the fixed condition, he or she is allowed four minutes. Jones-Gotman and Milner purported that a subject's performance on this test is dependent upon processes of the right hemisphere.

The hypotheses of this study were as follow: 1) design fluency measures will correlate significantly with word fluency measures, thereby substantiating previous findings that these are analogous tests; 2) factors such as gender, education,

handedness, and eyedness will not be associated with the verbal and nonverbal fluency measures in this sample.

The sample comprised 67 subjects - 30 male and 37 female - ranging from ages 12 to 71 years (M = 35.74, SD = 13.46). A demographics questionnaire was completed by each subject before testing, which included the Edinburgh Handedness Inventory, a measure of dominant hand use.

In order to determine whether gender had any effect upon verbal and nonverbal fluency measures, multiple t-tests were performed for all conditions. Separate variance estimates were utilized due to the larger population of females in the sample. Non-parametric analyses (Mann-Whitney U test) were performed to determine whether handedness and/or eyedness have a significant effect upon fluency. This test was chosen due to the relatively fewer number of subjects who were either left hand or eye dominant. Lastly, correlational analyses (Pearson Product-Moment) were performed to determine the amount of intra-subject associations across all conditions (e.g., free verbal vs. free design) and to determine whether years of education and/or age are associated with any of the fluency measures. The level of significance chosen for all of the above analyses was 0.05.

Results of this study suggest that no significant gender effects exist across all measures of fluency. Handedness also fails to differentiate groups on measures of verbal and nonverbal fluency. Eyedness, however, is found to significantly affect measures of nonverbal fluency for the fixed design condition

(Mann-Whitney P=0.0396). Correlational data reveals significant associations between years of education and all fluency measures (fixed design P=.000; free design P=.000; free verbal P=.020; fixed verbal P=.005). Significant associations also appear among all intra-subject comparisons of fluency output except the conditions fixed verbal vs. free design (free verbal vs. free design P=.003; fixed verbal vs. fixed design P=.003; free verbal vs. fixed verbal P=.000; free design vs. fixed design P=.000; free verbal vs. fixed design P=.000). Age is not found to be significantly associated with any of the fluency measures.

The aforementioned hypothesis that design fluency measures will correlate significantly with word fluency measures has been accepted except in the conditions fixed verbal vs. free design. It appears as though with the significantly associated conditions, cross-modal similarities exist in left and right hemispere functions of the brain. This suggests that design fluency may indeed be the nonverbal analogue to word fluency. The hypothesis that education is not associated with fluency measures has been rejected. It appears that as years of education increases, fluency also increases. The association between handedness and fluency measures in this sample is not significant, therefore the hypothesis that these two variables are not related has been accepted. Eyedness, however, is found to be associated with fixed design output, therefore, the hypothesis that this variable has no effect on nonverbal fluency has been rejected. Age and gender effects across all dependent

variables are not significant, thereby leading this investigator to accept the hypothesis that these variables bear no relationship to fluency measures.

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